

The physics of nucleus-nucleus fusion

W. Swiatecki¹

¹LBNL, USA

wjswiatecki@lbl.gov

Twelve measured cross sections for one-neutron-out reactions with ^{208}Pb and ^{209}Bi targets and projectiles ranging from ^{48}Ca to ^{70}Zn are compared with a theoretical model. The model assumes that the cross section is the product of three factors: a) the cross section for the nuclei to stick, b) the probability for the system to diffuse ("up hill") over the barrier separating it from the compound-nucleus configuration and c) the probability for the compound nucleus to survive fission and the emission of a second neutron. With one parameter adjusted to have the value 1.6 fm (equal to the separation between the nuclear surfaces at which the diffusion process begins) the cross sections, ranging over 6 orders of magnitude, are reproduced adequately. The centroids and widths of the excitation functions are in good agreement with measurements. The model is used to calculate cross sections for even heavier reactions, using the same targets and ^{76}Ge , ^{82}Se and ^{86}Kr as projectiles.